IN THE CLAIMS:

This listing of claims will replace all prior versions, and listing, of claims in the application.

Listing of the Claims:

1. (Currently amended) An automated method of scoring Oestrogen and Progesterone Receptors expression (ER and PR) from image data obtained from histological slides having image pixels which are dark relative to other image pixels which are bright, the method comprising using computer apparatus to obtaining the number of relatively dark image pixels by counting those pixels having intensities below a predetermined intensity threshold, and scoring ER or PR in accordance with the magnitude of the number so obtained and providing the score for input to a diagnostic report.

2. (Currently amended) An automated method of scoring Oestrogen and Progesterone Receptors expression (ER and PR) from image data obtained from histological slides having image pixels which are dark relative to other image pixels which are bright, the method comprising using computer apparatus to determineing the number of relatively dark image pixels by transforming the image data to a different image space having an intensity image plane, counting the number of image pixels having intensities below a predetermined intensity threshold, and scoring ER or PR in accordance with the magnitude of the number of relatively dark image pixels and providing the score for input to a diagnostic report.

3. (Currently amended) An automated method of scoring Oestrogen and Progesterone Receptors expression (ER and PR) from image data obtained from histological slides, the method including using computer apparatus to carry out the steps of:
    a) determining the number of pixels in an image having intensities below a predetermined intensity threshold and which are thereby relatively dark compared to other pixels in the image,
    b) determining pixel number thresholds to quantify scoring, and

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c)   comparing the number of relatively dark pixels with the pixel number thresholds and ~~scoring~~ producing an ER or PR score in accordance therewith, and

d)   providing the score for input to a diagnostic report.

4.   (Currently amended) An automated method of scoring Oestrogen and Progesterone Receptors expression (ER and PR) from image data obtained from histological slides, the image data comprising pixels corresponding to blobs and pixels corresponding to background, and the method ~~having~~ comprising using computer apparatus to carry out the steps of:

a)   determining what proportion of total blob area is brown blob area in an image,

b)   determining brown blob area proportion thresholds to quantify scoring, ~~and~~

c)   comparing the brown blob area proportion with the brown blob area proportion thresholds ~~scoring~~ and producing an ER or PR score in accordance therewith, and

d)   providing the score for input to a diagnostic report.

5.   (Currently amended) An automated method of scoring Oestrogen and Progesterone Receptors expression (ER and PR) from image data obtained from histological slides, the method including using computer apparatus to carry out the steps of:

a)   remapping pixel intensities in the image data to increase the contrast of relatively darker image regions and to transform relatively brighter image regions into a contrast-free background,

b)   converting the remapped image data into image data corresponding to thresholded binary images from which total blob area and brown blob area are discernible respectively,

c)   expressing brown blob area as a proportion of total blob area,

d)   determining brown blob area proportion thresholds to quantify scoring, ~~and~~

e)   comparing the brown blob area proportion with the brown blob area proportion thresholds and ~~scoring~~ producing an ER or PR score in accordance therewith, and

f)   providing the score for input to a diagnostic report.

6. (Currently amended) A method according to Claim 4 wherein the step of comparing the brown blob area proportion with the brown blob area proportion thresholds provides a first contribution to an ER or PR score, and the method includes using the computer apparatus to carry out the further steps of:

[[a)]]i) providing a second contribution to the ER or PR score by determining the number of pixels in an image having intensities below a predetermined intensity threshold and which are thereby relatively dark compared to other pixels in the image and deriving the second contribution in accordance with the magnitude of the number of relatively dark pixels, and

[[b)]]ii) combining the first and second contributions.

7. (Currently amended) An automated method of scoring Oestrogen and Progesterone Receptors expression (ER and PR) from image data obtained from histological slides, the method including using computer apparatus to carry out the steps of:

a) determining what proportion of total blob area is brown blob area in an image,

b) determining brown blob area proportion thresholds to quantify scoring,

c) comparing the brown blob area proportion with the brown blob area proportion thresholds to provide a first contribution to an ER or PR score,

d) providing a second contribution to the ER or PR score by determining the number of relatively dark image pixels compared to relatively bright image pixels by transforming the image data to a different image space having an intensity image plane and counting the number of pixels having intensity below a predetermined intensity threshold,

e) deriving the second contribution in accordance with the magnitude of the number of relatively dark pixels, ~~and~~

f) combining the first and second contributions, and

g) providing the score for input to a diagnostic report.

8.   (Currently amended) An automated method of scoring Oestrogen and Progesterone Receptors expression (ER and PR) for image data obtained from histological slides, the method ~~having~~ including using computer apparatus to carry out the steps of:

a)   remapping pixel intensities in the image data to increase the contrast of relatively darker image regions and to transform relatively brighter image regions into a contrast-free background,

b)   converting the remapped image data into image data corresponding to thresholded images in which total blob area and brown blob area respectively are distinguished from other image regions,

c)   expressing brown blob area as a proportion of total blob area to provide a first contribution to a score,

d)   providing a second contribution to the score by determining the number of relatively dark image pixels compared to relatively bright image pixels and deriving the second contribution in accordance with the magnitude of the number of relatively dark pixels, ~~and~~

e)   deriving the score on the basis of the first and second contributions collectively, and

f)   providing the score for input to a diagnostic report.

9.   (Previously presented) A method according to Claim 8 including determining a hue for the image data and deriving a correction for the score indicated by the first and second contributions if the hue indicates a degree of blueness or brownness which renders such correction appropriate.

10.   (Currently amended) ~~Computer apparatus~~ A system for computer-implemented scoring of Oestrogen and Progesterone Receptors expression (ER and PR) from image data obtained from histological slides, the system incorporating a microscope and a camera for photographing a histopathological specimen and arranged to provide digitised colour image data, and computer apparatus for receiving the digitised colour image data, such data having image pixels which are dark relative to other image pixels which are bright, the computer apparatus incorporating a computer program stored in a memory and being

programmed <u>by such computer program</u> to obtain the number of relatively dark image pixels by counting those pixels having intensities below a predetermined intensity threshold, <s>and</s> to <u>obtain a</u> score <u>for</u> ER or PR in accordance with the magnitude of the number so obtained <u>and to provide the score for input to a diagnostic report</u>.

11. (Currently amended) <s>Computer apparatus</s> <u>A system</u> for <u>computer-implemented</u> scoring of Oestrogen and Progesterone Receptors expression (ER and PR) from image data obtained from histological slides<u>, the system incorporating a microscope and a camera for photographing a histopathological specimen and arranged to provide digitised colour image data, and computer apparatus for receiving the digitised colour image data, such data</u> having relatively dark image pixels and relatively bright image pixels, the computer apparatus <u>incorporating a computer program stored in a memory and</u> being programmed <u>by such computer program</u> to determine the number of relatively dark image pixels by transforming the image data to a different image space having an intensity image plane and counting the number of image pixels having intensities below a predetermined intensity threshold, and also being programmed to <u>obtain a</u> score <u>for</u> ER or PR in accordance with the magnitude of the number of relatively dark image pixels <u>and to provide the score for input to a diagnostic report</u>.

12. (Currently amended) <s>Computer apparatus</s> <u>A system</u> for <u>computer-implemented</u> scoring of Oestrogen and Progesterone Receptors expression (ER and PR) from image data obtained from histological slides<u>, the system incorporating a microscope and a camera for photographing a histopathological specimen and arranged to provide digitised colour image data, and computer apparatus for receiving the digitised colour image data,</u> the image data comprising pixels corresponding to blobs and pixels corresponding to background and the computer apparatus <u>incorporating a computer program stored in a memory and</u> being programmed <u>by such computer program</u> to:

a) determine the number of pixels in an image having intensities below a predetermined intensity threshold and which are thereby relatively dark compared to other pixels in the image,

b) determine pixel number thresholds to quantify scoring, and

c)   compare the number of relatively dark pixels with the pixel number thresholds and score ER or PR in accordance therewith.

13.   (Currently amended) ~~Computer apparatus~~ A system for computer-implemented scoring of Oestrogen and Progesterone Receptors expression (ER and PR) from image data obtained from histological slides, the system incorporating a microscope and a camera for photographing a histopathological specimen and arranged to provide digitised colour image data, and computer apparatus for receiving the digitised colour image data, the image data comprising pixels corresponding to blobs and pixels corresponding to background and the computer apparatus incorporating a computer program stored in a memory and being programmed by such computer program to:

a)   determine what proportion of total blob area is brown blob area in an image,

b)   determine brown blob area proportion thresholds to quantify scoring, and

c)   compare the brown blob area proportion with the brown blob area proportion thresholds and score ER or PR in accordance therewith.

14.   (Currently amended) ~~Computer apparatus~~ A system for computer-implemented scoring of Oestrogen and Progesterone Receptors expression (ER and PR) from image data obtained from histological slides, the system incorporating a microscope and a camera for photographing a histopathological specimen and arranged to provide digitised colour image data, and computer apparatus for receiving the digitised colour image data, the computer apparatus incorporating a computer program stored in a memory and being programmed by such computer program to:

a)   remap pixel intensities in the image data to increase the contrast of relatively darker image regions and to transform relatively brighter image regions into a contrast-free background,

b)   convert the remapped image data into image data corresponding to thresholded binary images from which total blob area and brown blob area are discernible respectively,

c)   express brown blob area as a proportion of total blob area,

d)   determine brown blob area proportion thresholds to quantify scoring, and

e)   compare the brown blob area proportion with the brown blob area proportion thresholds and score ER or PR in accordance therewith.

15.   (Currently amended) ~~Apparatus~~ A system according to Claim 13 <u>wherein the computer apparatus is</u> programmed <u>by the computer program</u> to<u>:</u>

     [[a)]]<u>i)</u>   compare the brown blob area proportion with the brown blob area proportion thresholds to provide a first contribution to an ER or PR score, ~~and the apparatus also being programmed to~~:

     [[b)]]<u>ii)</u>   provide a second contribution to ~~scoring~~ the ER or PR score by determining the number of pixels in an image having intensities below a predetermined intensity threshold and which are thereby relatively dark compared to other pixels in the image and derive the second contribution in accordance with the magnitude of the number of relatively dark pixels, and

     [[c)]]<u>iii)</u>   combine the first and second contributions.

16.   (Currently amended) ~~Computer apparatus~~ A system for <u>computer-implemented</u> scoring of Oestrogen and Progesterone Receptors expression (ER and PR) from image data obtained from histological slides<u>, the system incorporating a microscope and a camera for photographing a histopathological specimen and arranged to provide digitised colour image data, and computer apparatus for receiving the digitised colour image data</u>, the computer apparatus <u>incorporating a computer program stored in a memory and</u> being programmed <u>by such computer program</u> to:

     a)   determine what proportion of total blob area is brown blob area in an image,

     b)   determine brown blob area proportion thresholds to quantify scoring, and

     c)   compare the brown blob area proportion with the brown blob area proportion thresholds and score ER or PR in accordance therewith to provide a first contribution to an ER or PR score,

     d)   transform the image data to a different image space having an intensity image plane and count the number of image pixels having intensity below a

predetermined intensity threshold and which are thereby relatively dark compared to other image pixels which are relatively bright,

e)   derive a second contribution to an ER or PR score in accordance with the magnitude of the number of relatively dark image pixels, and

f)   combine the first and second contributions.

17.   (Currently amended) ~~Computer apparatus~~ A system for computer-implemented scoring of Oestrogen and Progesterone Receptors expression (ER and PR) from image data obtained from histological slides, the system incorporating a microscope and a camera for photographing a histopathological specimen and arranged to provide digitised colour image data, and computer apparatus for receiving the digitised colour image data, the computer apparatus incorporating a computer program stored in a memory and being programmed by such computer program to:

a)   remap pixel intensities in the image data to increase the contrast of relatively dark image regions and to transform relatively bright image regions into a contrast-free background,

b)   convert the remapped image data into image data corresponding to thresholded binary images in which total blob area and brown blob area respectively are distinguished from other image regions,

c)   express brown blob area as a proportion of total blob area to provide a first contribution to a score,

d)   provide a second contribution to the score by determining the number of relatively dark image pixels compared to relatively bright image pixels and deriving the second contribution in accordance with the magnitude of the number of relatively dark pixels, and

e)   derive the score on the basis of the first and second contributions collectively.

18.   (Currently amended) ~~Apparatus~~ A system according to Claim 17 wherein the computer apparatus is programmed by the computer program to determine a hue for the image data and derive a correction for the score indicated by the first and second contributions if the

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hue indicates a degree of blueness or brownness which renders such correction appropriate.

19. (Currently amended) A ~~computer software product comprising a~~ computer readable hardware medium ~~containing~~ which embodies computer readable instructions for controlling operation of a computer apparatus to implement scoring of Oestrogen and Progesterone Receptors expression (ER and PR) from image data obtained from histological slides having image pixels which are dark relative to other image pixels which are bright, wherein the instructions ~~are~~ provide for control of the computer apparatus to carry out the steps of obtaining the number of relatively dark image pixels by counting those pixels having intensities below a predetermined intensity threshold and scoring ER or PR in accordance with the magnitude of the number so obtained.

20. (Currently amended) A ~~computer software product~~ hardware medium according to Claim 19 wherein the instructions ~~are~~ also provide for control of the computer apparatus to implement obtaining the number of relatively dark image pixels by transforming the image data to a different image space having an intensity image plane and counting the number of pixels having intensities below a predetermined intensity threshold.

21. (Currently amended) A ~~computer software product comprising a~~ computer readable hardware medium ~~containing~~ which embodies computer readable instructions for controlling operation of a computer apparatus to implement scoring of Oestrogen and Progesterone Receptors expression (ER and PR) from image data obtained from histological slides, wherein the instructions ~~are~~ provide for control of the computer apparatus to carry out the steps of:
   a)   determining the number of pixels in an image having intensities below a predetermined intensity threshold and which are thereby relatively dark compared to other pixels in the image,
   b)   determining pixel number thresholds to quantify scoring, and
   c)   comparing the number of relatively dark pixels with the pixel number thresholds and scoring ER or PR in accordance therewith.

22. (Currently amended) A ~~computer software product comprising a~~ computer readable hardware medium ~~containing~~ which embodies computer readable instructions for controlling operation of a computer apparatus to implement scoring of Oestrogen and Progesterone Receptors expression (ER and PR) from image data obtained from histological slides, the image data comprising pixels corresponding to blobs and pixels corresponding to background and the instructions ~~being~~ providing for control of the computer apparatus to carry out the steps of:

   a)   determining what proportion of total blob area is brown blob area in an image,

   b)   determining brown blob area proportion thresholds to quantify scoring, and

   c)   comparing the brown blob area proportion with the brown blob area proportion thresholds and scoring ER or PR in accordance therewith.

23. (Currently amended) A ~~computer software product~~ hardware medium according to Claim 22 wherein the computer readable instructions include instructions for determining the proportion of total blob area which is brown blob area by ~~are~~ providing for control of the computer apparatus to carry out the following further steps:

   [[a)]]i)   remapping pixel intensities in the image data to increase the contrast of relatively darker image regions and to transform relatively brighter image regions into a contrast-free background,

   [[b)]]ii)   converting the remapped image data into image data corresponding to thresholded binary images from which total blob area and brown blob area are discernible respectively, and

   [[c)]]iii)   expressing brown blob area as a proportion of total blob area.

24. (Currently amended) A ~~computer software product~~ hardware medium according to Claim 22 wherein the computer readable instructions for comparing the brown blob area proportion with the brown blob area proportion thresholds are for providing a first contribution to an ER or PR score and the ~~product~~ hardware medium also includes instructions ~~are~~ providing for control of the computer apparatus to carry out the following further steps:

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[[a]]i)   providing a second contribution to the ER or PR score by determining the number of pixels in an image having intensities below a predetermined intensity threshold and which are thereby relatively dark compared to other pixels in the image and deriving the second contribution in accordance with the magnitude of the number of relatively dark pixels, and

[[b)]]ii)   combining the first and second contributions.

25.   (Currently amended) A ~~computer software product~~ hardware medium according to Claim 24 wherein the computer readable instructions include instructions providing for control of the computer apparatus to determine ~~ing~~ the number of relatively dark image pixels by transforming the image data to a different image space having an intensity image plane and to count ~~ing~~ the number of pixels having intensity below a predetermined intensity threshold.

26.   (Currently amended) A ~~computer software product comprising a~~ computer readable hardware medium ~~containing~~ which embodies computer readable instructions for controlling operation of a computer apparatus to score Oestrogen and Progesterone Receptors expression (ER and PR) from image data obtained from histological slides, the instructions ~~being~~ providing for control of the computer apparatus to implement ~~ing~~ the steps of:

a)   remapping pixel intensities in the image data to increase the contrast of relatively dark image regions and to transform relatively bright image regions into a contrast-free background,

b)   converting the remapped image data into image data corresponding to thresholded images in which total blob area and brown blob area respectively are distinguished from other image regions,

c)   expressing brown blob area as a proportion of total blob area to provide a first contribution to a score,

d)   providing a second contribution to the score by determining the number of relatively dark image pixels compared to relatively bright image pixels and

deriving the second contribution in accordance with the magnitude of the number of relatively dark pixels, and

e)   deriving the score on the basis of the first and second contributions collectively.

27.   (Currently amended) A ~~computer software product~~ hardware medium according to Claim 26 wherein the computer readable instructions include instructions providing for control of the computer apparatus to determine ~~ing~~ a hue for the image data and to derive ~~ing~~ a correction for the score indicated by the first and second contributions if the hue indicates a degree of blueness or brownness which renders such correction appropriate.